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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,515	12/04/2003	Hoon Song	249/420	7193

27849 7590 11/14/2005

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EXAMINER

MRUK, GEOFFREY S

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 11/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H-A

**Office Action Summary**

Application No.

10/726,515

Applicant(s)

SONG ET AL.

Examiner

Geoffrey Mruk

Art Unit

2853

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 12-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 12/4, 3/15, 6/23.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election of Group I in the reply filed on 9 August 2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### ***Claim Objections***

Claim 2 is objected to because of the following informalities: claim 2 states "the hydrophobic coating layer is made of a material having appropriate chemical resistance and abrasion resistance". The term "appropriate" is indefinite. In light of the specification, the examiner will interpret "appropriate" to mean resistance to oxidation and resistance to friction. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 3, 8, 10, and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Min et al. (US 6,663,266 B2).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

With respect to claim 1, Min discloses a monolithic ink-jet printhead (Column 3, lines 7-20), comprising:

- a substrate (Fig. 6, element 11) having an ink chamber (Fig. 6, element 15) to be supplied with ink to be ejected,
- a manifold (Column 1, line 54) for supplying ink to the ink chamber, and an ink channel for providing communication between the ink chamber and the manifold (Column 1, lines 52-58);
- a nozzle plate (Fig. 6, element 12; Column 7, line 15) including a plurality of passivation layers (Fig. 6, elements 12a-12d) sequentially stacked on the substrate, a metal layer (Fig. 6, element 191) formed on the plurality of passivation layers, and
- a nozzle (Fig. 6, element 13), through which ink is ejected from the ink chamber, that penetrates the nozzle plate;

Art Unit: 2853

- a heater (Fig. 6, element 18) provided between adjacent passivation layers of the plurality of passivation layers, the heater being located above the ink chamber (Fig. 6, element 15) for heating ink within the ink chamber;
- a conductor (Fig. 6, element 182) provided between adjacent passivation layers of the plurality of passivation layers, the conductor being electrically connected to the heater for applying a current to the heater (Column 7, lines 48-51) ; and
- a hydrophobic coating layer (Fig. 6, element 12d) formed exclusively on an outer surface of the metal layer (Column 6, lines 13-18).

With respect to claim 2, Min discloses the hydrophobic coating layer is made of a material having appropriate chemical resistance and abrasion resistance (Column 6, lines 13-18).

With respect to claim 3, Min discloses the hydrophobic coating layer is made of at least one material selected from the group consisting of a fluorine-containing compound (Column 6, lines 13-18) and a metal (Fig. 6, element 12c).

With respect to claim 8, Min discloses the nozzle (Fig. 6, element 13) comprises: a lower nozzle (Fig. 6, interface between elements 13 and 15) formed through the plurality of passivation layers; and an upper nozzle (Fig. 6, element 13) formed through the hydrophobic coating layer (Fig. 6, element 12d) and the metal layer (Fig. 6, element 12c).

With respect to claim 10, Min discloses the nozzle plate further comprises: a heat conductive layer (Fig. 6, element 191), which is located above the ink chamber and

Art Unit: 2853

insulated from the heater and the conductor, the heat conductive layer thermally contacting the substrate and the metal layer (Column 7, lines 44-51).

With respect to claim 11, Min discloses the heat conductive layer (Fig. 6, element 191) is made of any one of a material selected from the group consisting of aluminum, aluminum alloy, gold, and silver (Column 7, lines 36-38).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claim 4 is rejected under 35 U.S.C. 103(a) as being obvious over Min et al. (US 6,663,266 B2) in view of Kuhman et al. (US 6,243,112 B1).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR

1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

With respect to claim 4, Min discloses the fluorine-containing compound (Fig. 6, element 12; Column 6, lines 13-18).

However, Min fails to disclose the fluorine-containing compound is selected from the group consisting of polytetrafluoroethylene (PTFE) and fluorocarbon.

Kuhman discloses forming a fluoropolymer film on the front face side of a thermal ink jet printhead where "The preparation of plasma deposited fluoropolymer films has been a topic of scientific experimentation for many years and is extensively summarized in Plasma Deposition, Treatment and Etching of Polymers, edited by R. D'Agostino, Academic Press, 1990, Chapter 2. In general, the higher the fluorine to carbon (F/C) ratio and the more CF<sub>2</sub> and CF<sub>3</sub> type bonding, as compared with CF type bonding, the more hydrophobic the material and more effective the material is as an ink repellent front face coating. A --CF<sub>2</sub>-- bonding structure, as is found in polytetrafluoroethylene (PTFE), i.e. Teflon®. (F/C equals 2), results in a low surface energy and makes the layer highly hydrophobic" (Column 2, lines 51-59).

At the time of the invention, it would have been obvious for one of ordinary skill in the art to use the teachings of Kuhman for the fluorine-containing compound disclosed

by Min. The motivation for doing so would have been to provide "a coating layer that has increased hydrophobicity and is mechanically durable in order to increase the lifetime of the printhead" (Column 4, lines 17-22).

2. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being obvious over Min et al. (US 6,663,266 B2) in view of Hess (US 6,273,555 B1).

With respect to claim 5, Min discloses the printhead (Fig. 6; Column 3, lines 7-20) with metal (Fig. 6, element 12c).

With respect to claim 6, Min discloses the printhead (Fig. 6; Column 3, lines 7-20) with a metal layer (Fig. 6, element 182).

However, Min fails to disclose the metal is gold (Au) and the metal layer is made of a material selected from the group consisting of nickel (Ni) and Copper (Cu).

Hess discloses a high efficiency ink delivery printhead having improved thermal characteristics where "In general, the orifice plate 104 consists of a panel member 106 (illustrated schematically in FIG. 1) which is manufactured from one or more metal compositions (e.g. gold-plated nickel [Ni] and the like)" (Column 16, lines 5-9) and "The present invention shall not be restricted to any particular materials, configurations, dimensions, and the like in connection with the conductive layer 214 and portions 220 thereof, with the claimed system not being "conductive layer specific". Many different compositions may be used to fabricate the conductive layer 214 including but not limited to the following representative materials: elemental aluminum [Al], elemental gold [Au], elemental copper [Cu], and elemental silicon [Si], with elemental aluminum being preferred" (Column 24, lines 29-38).



At the time of the invention, it would have been obvious for one of ordinary skill in the art to use the teachings of Hess for the ink-jet printhead disclosed by Min. The motivation for doing so would have been to "provide a highly efficient thermal inkjet printhead which employs an internal structure that offers improved thermal stability" (Column 4, lines 51-53).

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being obvious over Min et al. (US 6,663,266 B2) in view of Radke et al. (US 5,859,654).

With respect to claim 7, Min discloses the printhead (Fig. 6; Column 3, lines 7-20) with a metal layer (Fig. 6, element 182).

However, Min fails to disclose the metal layer is formed by electroplating to a thickness of about 30-100  $\mu\text{m}$ .

Radke discloses a print head for ink-jet printing where "The print head 12 includes a nozzle plate 14 that is fabricated from nickel and electroformed on a mandrel. The nozzle plate is about 50 microns thick" (Column 3, lines 34-39).

At the time of the invention, it would have been obvious for one of ordinary skill in the art to use the teachings of Radke for the ink-jet printhead disclosed by Min. The motivation for doing so would have been the "a need for an approach that avoids both full and partial delamination of the orifice plate-ink barrier layer interface" (Column 2, lines 14-16).

4. Claim 9 is rejected under 35 U.S.C. 103(a) as being obvious over Min et al. (US 6,663,266 B2) in view of Silverbrook (US 6,019,457).

With respect to claim 9 Min discloses a printhead with an upper nozzle (Fig. 6, element 13).

However, Min fails to disclose the upper nozzle has a tapered shape in which a cross-sectional area decreases gradually toward an exit.

Silverbrook discloses an ink jet print device where the upper nozzle (Fig. 18, element 486) has a tapered shape (Fig. 18, element 488) in which a cross-sectional area decreases gradually toward an exit.

At the time of the invention, it would have been obvious for one of ordinary skill in the art to use the teachings of Silverbrook for the ink-jet printhead disclosed by Min. The motivation for doing so would have been the "bubble jet print device comprising a plurality of nozzles each communicating with a corresponding passageway for the supply of ink to the nozzle, and heater means associated with each the passageway or nozzle, characterized in that the nozzles, passageways and heater means are integrally formed" (Column 1, lines 62-67; Column 2, lines 1-3).

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 8, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Silverbrook (US 6,019,457).

With respect to claim 1, Silverbrook discloses a monolithic ink-jet printhead (Column 1, lines 62-67; Column 2, lines 1-3), comprising:

- a substrate (Fig. 12, element 130) having an ink chamber (Fig. 12, element 115) to be supplied with ink to be ejected,
- a manifold (Column 5, lines 49-51) for supplying ink to the ink chamber, and an ink channel for providing communication between the ink chamber and the manifold (Column 5, lines 49-55);
- a nozzle plate (Fig. 12, element 142) including a plurality of passivation layers (Column 7, lines 42-50) sequentially stacked on the substrate, a metal layer (Fig. 12, elements 134, 138) formed on the plurality of passivation layers, and
- a nozzle (Fig. 10, elements 111, 113), through which ink is ejected from the ink chamber, that penetrates the nozzle plate;
- a heater (Fig. 12, element 120) provided between adjacent passivation layers of the plurality of passivation layers, the heater being located above the ink chamber (Fig. 16, element 120) for heating ink within the ink chamber;
- a conductor (Fig. 12, element 134) provided between adjacent passivation layers of the plurality of passivation layers, the conductor being electrically connected to the heater for applying a current to the heater (Column 8, lines 2-5) ; and
- a hydrophobic coating layer (Fig. 12, element 144) formed exclusively on an outer surface of the metal layer (Column 9, lines 11-14).

Art Unit: 2853

With respect to claim 2, Silverbrook discloses the hydrophobic coating layer is made of a material having appropriate chemical resistance and abrasion resistance (Column 9, lines 11-14).

With respect to claim 8, Silverbrook discloses the nozzle (Fig. 10, elements 111, 113) comprises: a lower nozzle (Fig. 12, interface between elements 115 and 132) formed through the plurality of passivation layers; and an upper nozzle (Fig. 10, element 111) formed through the hydrophobic coating layer (Fig. 12, element 144) and the metal layer (Fig. 12, element 134).

With respect to claim 9, Silverbrook discloses the upper nozzle (Fig. 18, element 486) has a tapered shape (Fig. 18, element 488) in which a cross-sectional area decreases gradually toward an exit.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is 571 272-2810. The examiner can normally be reached on 7am - 330pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on 571 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2853

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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11/5/2005

GM

 11/9/05  
**MANISH S. SHAH**  
**PRIMARY EXAMINER**